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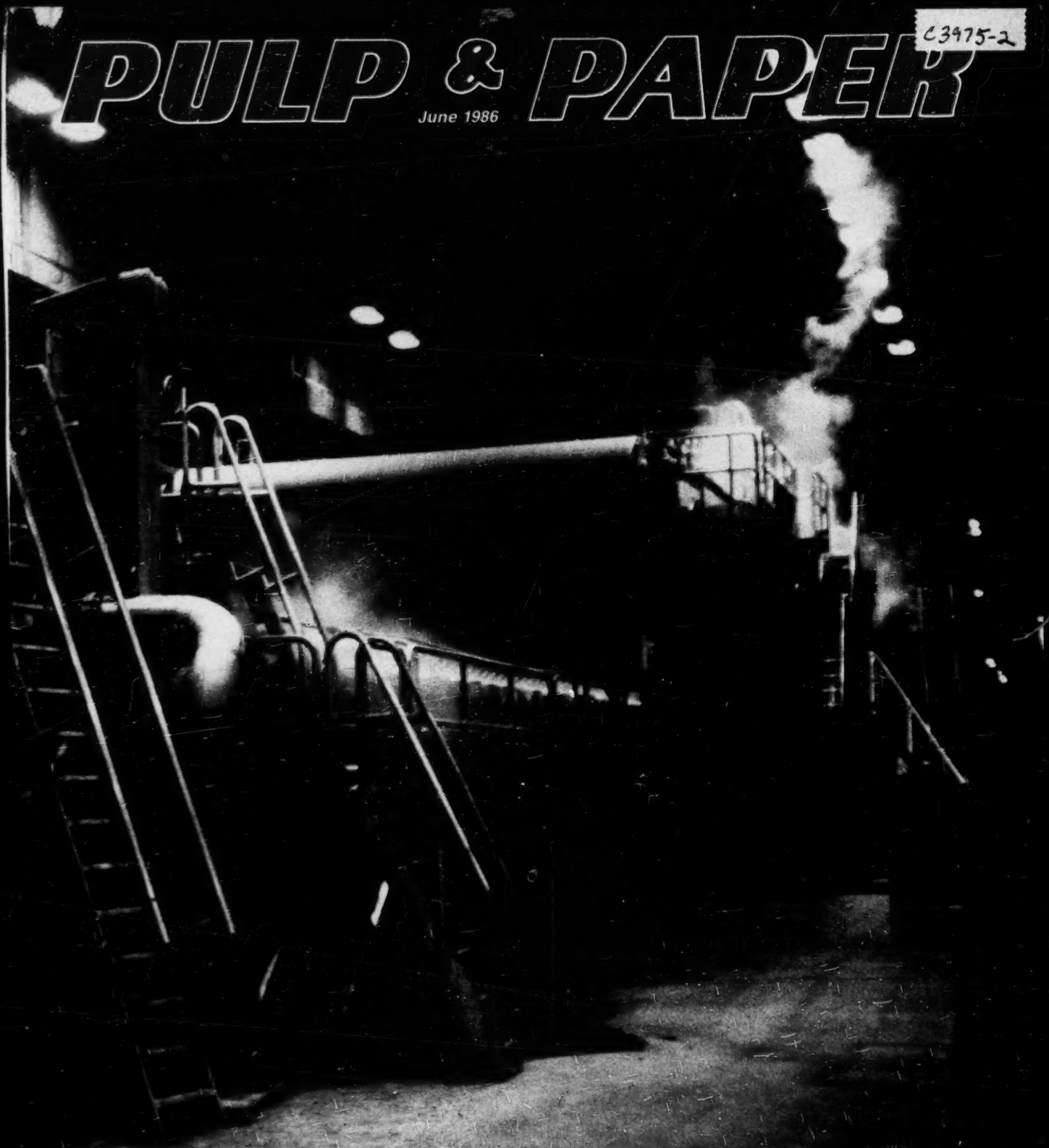
PULP & PAPER

June 1986



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POWER/STEAM: FINE-TUNING MILL SYSTEMS FOR ADDITIONAL SAVINGS

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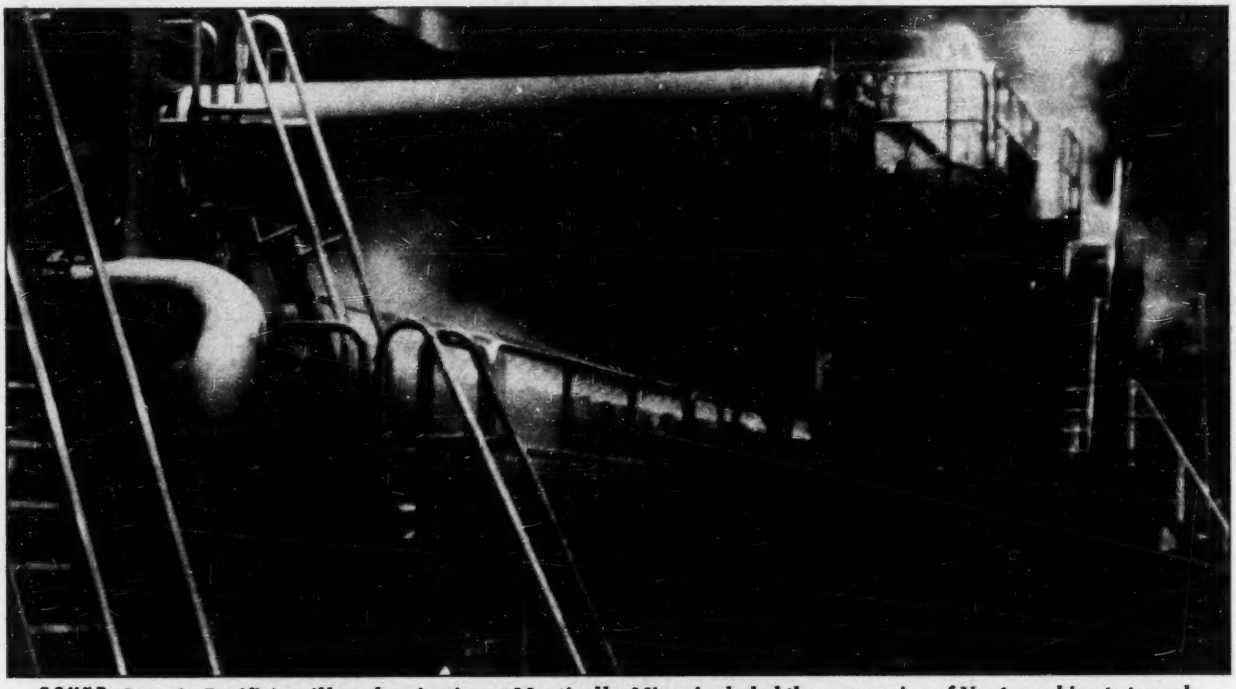
Number 6

JUNE



***COVER:** Georgia-Pacific's mill modernization at Monticello, Miss., included the conversion of No. 1 machine to two-ply lightweight linerboard production. See story beginning on page 92.* (Photo by Doug Matyka, courtesy of Georgia-Pacific Corp.)

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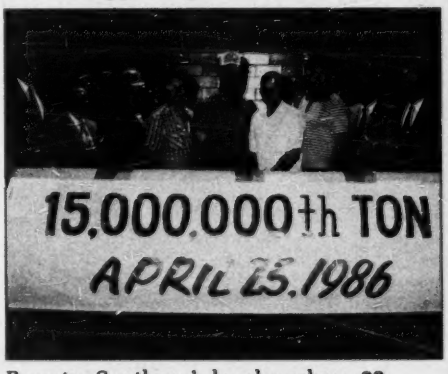

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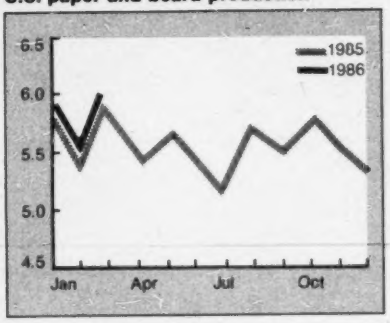
U.S. paper and board production



U.S. production of paper and paperboard in March moved above six million tons for the first time in two years, according to the American Paper Institute, with both paper and paperboard above the record three-million-ton level. March production totaled 6.1 million tons, up 2.5% from the previous year. First-quarter production was also strong, gaining 3.6% over the same period last year. Preliminary data for April show paper and board production following a flat trend about 2.5% above the comparable year-earlier level. The seasonally adjusted annual rate for February and March was 68.9 million tpy.

Among major grades, uncoated free-sheet and tissue were the only paper grades posting gains. Production of containerboard for domestic use was off 0.1% from last March, while corrugated box shipments rose 2.4%. Kraft linerboard exports were up a healthy 46.5% from depressed year-earlier levels.

Canadian newsprint shipments totaled 746 million tons in March, down 7.8% from a year earlier. The March operating rate stood at 89%, compared to 95% last year. Pulp shipments shot up 21.7% to 745 million tons for the month, pushing the operating rate to 97%. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	Mar.	491	0.4	5,552	−1.2
Uncoated groundwood (s)	Mar.	123	−8.9	1,461	−2.4
Coated paper (s)	Mar.	525	−1.9	6,141	−4.2
Uncoated free sheet (s)	Mar.	889	8.4	10,342	8.9
Other printing/writing	Mar.	108	−21.2	1,340	−10.0
Total packaging and other paper (s)	Mar.	446	−2.0	5,144	−4.1
Tissue	Mar.	431	0.2	4,997	1.1
Total paper	**Mar.**	**3,022**	**0.7**	**35,015**	**1.0**
Unbleached kraft paperboard	Mar.	1,496	−0.3	17,129	2.1
Semichemical medium	Mar.	459	6.7	5,275	5.8
Bleached paperboard	Mar.	378	8.0	4,293	8.1
Recycled paperboard	Mar.	701	1.2	8,062	4.9
Total paperboard	**Mar.**	**3,035**	**4.4**	**34,759**	**4.0**
Total U.S. paper and paperboard output	**Mar.**	**6,057**	**2.5**	**69,774**	**2.5**
PULP, WASTEPAPER & FIBER[2]					
Total U.S. woodpulp production	Feb.	4,407	1.1	55,521	3.2
Market pulp production	Feb.	589	0.2	7,270	3.8
Wastepaper consumption at paper/board mills	Feb.	1,417	17.5	17,750	14.8
Pulpwood consumption (cords)	Feb.	7,261	4.0	90,846	5.2
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	Mar.	22.567	2.4	67.948[6]	1.1
Containerboard inventories at U.S. box plants and mills	Mar. 1	2,489	−15.9		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	Feb.	963	11.1	11,395	7.7
Imports of Canadian newsprint	Feb.	706	9.3	8,190[6]	6.7
U.S. paper exports (including products)	Feb.	349	21.6	4,263	13.2
Exports of unbleached kraft linerboard	Feb.	148	46.5	1,865	21.5
Exports of woodpulp	Feb.	342	53.4	4,257	35.5
Norscan pulp inventories[4]	Mar. 31	1,133	−35.7		
Norscan pulp operating rates[4]	Mar.	89%	94%	86%	90%
CANADIAN STATISTICS[5] *(reported in metric tons)*					
Total newsprint shipments	Mar.	746	−7.8	2,156[6]	−4.3
Operating rates	Mar.	89%	95%	92%	96%
Inventories held by U.S. consumers	Mar. 31	1,424	−7.2		
Other paper/board shipments	Mar.	498	7.8	1,452	6.5
Woodpulp shipments (export only)	Mar.	745	21.7	1,897[6]	17.5
Operating rates	Mar.	97%	91%	91%	91%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

RECYCLED PAPERBOARD: Market starts to rebound

Grade structure: Secondary fiber makes up most of the fiber furnish of recycled paperboard, which includes the following grades: boxboard, corrugating medium, linerboard, gypsum linerboard, and core, can and tube stock. Recycled paperboard can be produced on either a fourdrinier or a multi-ply paper machine.

Production/capacity: Production was up 0.8% to 7.7 million short tons in 1985 from 1984. Demand began to improve late in the final quarter of 1985 and this continued through the first quarter of this year, with production up 5.6% for the first three months compared with the same period in 1985, according to American Paper Institute (API) figures.

Capacity rose just 1.7% in 1985 from the previous year, keeping the market relatively stable. Mills operated at 84.5% of capacity last year compared with 86.1% in 1984. This year, capacity is expected to rise 2.1% to 9.3 million tons, which should keep mills running at about an 85.8% rate.

Possible reactivation or dismantling of several mills that have been idle for more than a year could change the industry capacity outlook over the next couple of years. Federal Paper Board Co. Inc. had a tentative agreement with a Hong Kong firm in May to purchase machinery from its 85,000-tpy Marseilles, Ill., mill for shipment overseas. Other recycled board mills are also up for sale, including American Packaging Corp.'s Miamisburg, Ohio, mill, Big M Paperboard Inc.'s Palmyra, Mich., mill, and Whippany Paperboard Co.'s Whippany, N.J., mill. Harriman Paperboard Corp.'s idle Harriman, Tenn., mill is under a tentative agreement to be sold. Two other mills—International Paper Co., Durham, Pa., and V. Ponte & Sons, Clifton, N.J.—were bought over a year ago and not restarted.

Outlook: Boxboard demand picked up in the first quarter, but production was slowing down and backlogs had begun to shrink at some mills in April and May. Some attributed this to the normal summer slowdown. Others blamed price increases attempted in April and May but postponed until summer after buyers resisted.

Recycled paperboard production is expected to increase to 7.95 million tons in 1986, 3.2% ahead of 1985. Most market observers were heartened by the strong markets for solid bleached sulfate (SBS) and solid unbleached sulfate (SUS) boards: prices for both were successfully raised in April and May. It was thought that this would boost recycled prices this summer. The need for a recycled price increase was becoming more imperative as wastepaper prices continued to rise in the second quarter of this year. Clay-coated board prices have eroded continually since the peaks of 1981.

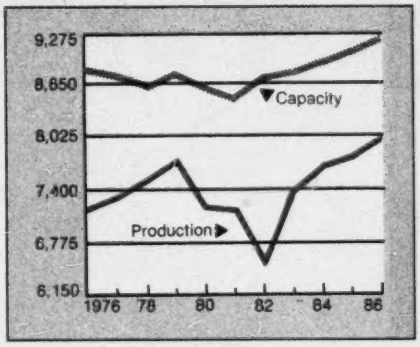
One obstacle to price relief is a large amount of capacity set to come online in the next three years. According to API, recycled capacity will rise 5%, or 448,000 tons, reaching 9.3 million tons by 1988. This will mark the highest three-year increase in ten years. Almost all of the additions, though, are in containerboard, a market which should show stronger growth because of limited expansion of kraft or semichemical mill capacity.

Prices: Prices on all grades of recycled board should increase this year. Clay-coated board prices will be helped by increases already implemented on competing SBS or SUS folding carton boards. Gypsum liner will be strengthened by the pickup in the housing market, which—together with improvement in other industries and the export market—will also bolster prices for other grades.

Clay-coated 20-pt folding carton boxboard (rolls), $/short ton, year-end: 1975, $257; 1976, $262; 1977, $284; 1978, $305; 1979, $355; 1980, $380; 1981, $400/425; 1982, $380/425; 1983, $370/425; 1984, $375/425; 1985, $350/400. Bending 20-pt chipboard (rolls), $/short ton, year-end: 1975, $204; 1976, $212; 1977, $219; 1978, $225; 1979, $260; 1980, $260/275; 1981, $270/280; 1982, $280; 1983, $280/300; 1984, $300; 1985, $300.

Markets: Market demand for recycled paperboard grades, measured by their capacity share, is: folding boxboard, 29.3%; setup boxboard, 3.4%; corrugating medium, 17.3%; gypsum linerboard, 14.4%; linerboard, 6.3%; container chipboard and filler board, 2.4%; other paperboard, 26.9%. ■

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

	1984	1985	1986e
Production[1]	7,637	7,701	7,950
Capacity[1]	8,896	9,077	9,268
Utilization rate	86.1%	84.8%	85.8%
Imports	69	68	80
Exports	169	246	375
Apparent U.S. consumption	7,537	7,523	7,655
lb/capita	63.8	63.0	63.6
GNP ratio	2.16	2.11	2.09

e = Estimate.
1. American papper Institute data.

TOP U.S. PRODUCERS (000 tpy)

	Annual capacity	Market share (%)
1. CCA	628	6.9
2. Sonoco Products	600	6.6
3. Newark Group[1]	568	6.3
4. Jefferson Smurfit	543	6.0
5. Caraustar	450	5.0
6. National Gypsum[2]	400	4.4
7. Waldorf[3]	362	4.0
8. Rock-Tenn	307	3.4
9. Federal Paper[4]	300	3.3
10. PCA	210	2.3

Market share of top five companies:
30.7%

Market share of top ten companies:
48.1%

Total U.S. capacity (1986):
9.077 million short tons

1. Includes 68,000-tpy Lawrence Paperboard Corp. mill.
2. Includes idle Kalamazoo, Mich., gypsum linerboard mill.
3. Bought former St. Regis recycled board mill in St. Paul, Minn., and Battle Creek, Mich., from Champion International last July.
4. Does not include 85,000-tpy Marseilles, Ill., recycled board mill.

MARKET PULP

Millar plans greenfield market CTMP facility

Millar Western Industries Ltd., a family-owned lumber company based in Edmonton, Alta., said it plans to build a greenfield bleached market chemithermomechanical pulp (CTMP) mill at Whitecourt, Alta.

Financing for the C$185-million project is in place, and preliminary engineering has already been completed, according to MacKenzie Millar, president of Millar Western Pulp. Final engineering for the new mill should be completed by Aug. 1 so that construction can start at the beginning of the fourth quarter. If all goes according to plan, the mill will begin production in the third or fourth quarter of 1988.

The bulk of the financing will come from the provincial government in the form of an interest-bearing, $120-million debenture. Alluding to the controversy surrounding Canadian government subsidies, particularly in the area of stumpage fees, Millar stressed that the project will not receive any government grants or interest-free loans.

Fine-tuned pulp. The new mill will be one of the largest of its kind in the world, with capacity for 177,500 a.d. metric tpy. Depending on product mix, the mill will produce 500 to 550 tpd of CTMP on its two independent lines. New fiber fractionation technology will allow the mill to "fine-tune" its pulp between the two lines for different end uses, Millar said. For example, short fibers could be extracted from one line and sent to the other to produce pulp for printing and writing paper, while longer fibers from the second line could be sent to the first to make pulp more suited for tissue and toweling production. The pulp will be fully bleached, with a brightness of around 80 on the ISO scale.

The mill will be able to vary its product mix between hardwood and softwood. From 50% to 75% of the mill's wood supply will be softwood chips from local sawmills, with aspen logs making up the difference. Millar's own sawmill in Whitecourt will supply about 40% of the CTMP mill's chip needs.

Given the ability to fine-tune its product, Millar Western expects to produce CTMP for a wide range of end uses, including printing and writing papers, tissue and toweling, and fluff. Potential markets include Japan, Europe, and the U.S., which is expected to be the mill's largest market.

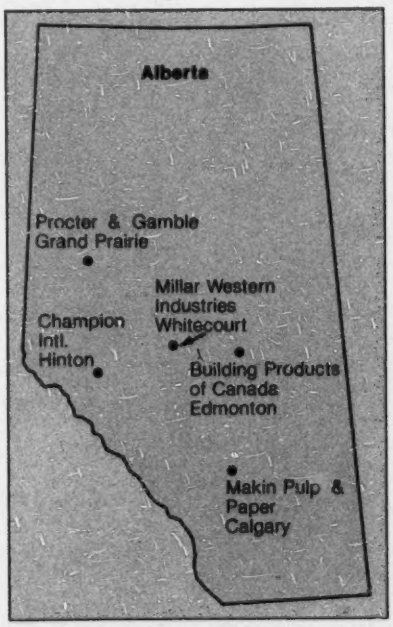
Marketing potential. CTMP already has a following among printing and writing paper producers in Europe, according to Millar, with most CTMP mills sold out. Some CTMP grades are even selling at a premium to northern bleached softwood kraft pulp, he added. Japanese printing and writing producers should also be willing customers, Millar and other observers say.

But the U.S. printing and writing market may be a harder nut to crack. While U.S. producers are interested, the market for CTMP is more potential than actual at this point, Millar acknowledged. Papermakers will need help to come up with products to take advantage of CTMP's special qualities, such as its high bulk, he added.

The market for CTMP is more established in tissue and toweling, but cheap eucalyptus kraft pulp has recently gained a following in this area among major U.S. producers, putting pressure on other grades. Millar feels, however, that the price of eucalyptus will rise as it becomes more popular, and that CTMP will find a niche under it.

Too much capacity? Another factor is the increasing popularity of market CTMP, which has been touted in several studies as one of the best ways to take advantage of Canada's cheap energy/expensive wood cost structure. Last year, market mechanical pulp capacity was expected to grow from 533,000 tpy in 1985 to 643,000 tpy in 1987, according to the Canadian Pulp & Paper Assn. That 23% increase included Tembec Inc.'s new 100,000-tpy mill at Temiscaming, Que., which is expected to start up soon.

Several other projects have been announced since then, however, and capacity could climb to 1,068,000 tpy by 1988—a 100% increase in just three years. Besides the Millar Western mill, new projects include Consolidated-Bathurst Inc.'s plan to add a bleach plant at its Bathurst, N.B., mill. Plus it will market an additional 80,000 to 85,000 tpy of bleached CTMP no longer required by its British newsprint mill in the domestic market beginning next fall. In addition, Cascades Inc. plans to reopen the for-

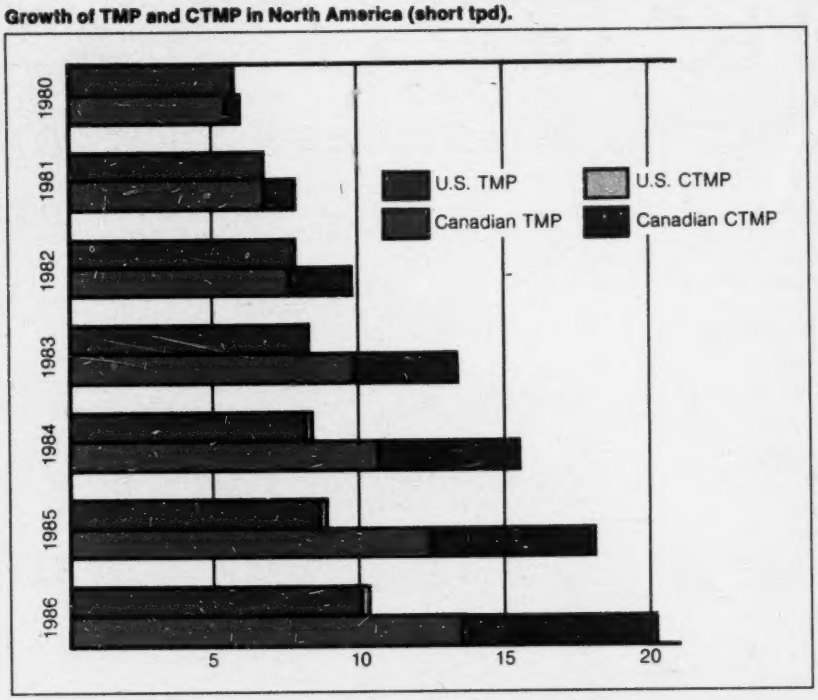


TOP: **CTMP projects planned at market pulp mills.** *BOTTOM:* **CTMP projects at paper mills.**

Company	Capacity (metric tpy)	Startup year
Tembec Temiscaming, Que.	100,000	1986
Cascades Port Cartier, Que.	160,000	1988
Fibreco Export B.C.	170,000	—
Con-Bath Bathurst, N.B.	85,000*	1987
Millar Western Ind. Whitecourt, Alta.	177,500	1988
MacBlo Powell River, B.C.	250,000	1986
Con-Bath Shawinigan, Que.	214,800	1987
Makin Brittania Beach, B.C.	135,000	1988

*Available for market after bleach plant expansion.

Growth of TMP and CTMP in North America (short tpd).



mer ITT Rayonier mill at Port Cartier, Que., as a 160,000-tpy market CTMP mill in 1988. The mill, which has a pulp dryer, will reportedly concentrate on fluff pulp. ITT Rayonier will market most of the output.

Another 170,000 tpy could be added to the total by Fibreco Export Inc., which may build a market CTMP mill in interior British Columbia. Fibreco is still studying the project and expects to make an announcement in about six months. ■

Champion studying project to double size of Hinton mill

Champion Forest Products (Alberta) Ltd. will conduct a C$3-million feasibility study of a project to modernize and expand its Hinton, Alta., market pulp mill, CFPA president Ken Hall has announced. The study will focus on engineering and funding for a project that would double the size of the existing mill, cost more than C$300 million, and provide 400 to 450 additional direct jobs.

"The modernized and expanded mill would use the latest technology to ensure the continued success of the operation on a cost competitive basis," the company said. The Hinton mill presently produces 206,000 metric tons of bleached softwood kraft pulp and 75 million bd ft of lumber per year. Annual sales of these products amount to approximately C$130 million.

Champion said that it is working cooperatively with the provincial and federal governments and the local community to establish the viability of the project. The Hinton mill has been in continuous operation since 1957 and was acquired by Champion from St. Regis Corp. in late 1984. Near the time of its acquisition, St. Regis had been considering Hinton as one of several possible sites for a proposed lightweight coated paper machine. However, Champion did not indicate that it had any plans to add papermaking capacity.

Due to the success of an intensive forestry program, the timber supply available from the company's Alberta forest management area has continued to increase. Some of this additional timber would be required for the expansion program.

Last year, Hinton shipped about 180,000 tons of bleached softwood kraft pulp, of which 175,000 went to the U.S. market. Of this, about 70,000 tons were market pulp and the remainder apparently was "tied" pulp utilized in Champion International's U.S. paper mills. ■

Tight pulp market precursor to price hikes next quarter?

North American market pulp is in tight supply and there is growing speculation about a further attempt to increase prices in either the third or fourth quarter. Industry observers say that southern pine and hardwood grades are in almost short supply and new Apr. 1 price levels of $420/metric ton for pine, $385 for northern hardwood, and $380 for southern mixed hardwood have generally taken hold. Northern bleached softwood kraft prices have also risen by $25/ton or more, although a number of suppliers are still selling below the new $450 list price. Some top-tier producers are at the new list price, however, and the price is expected to firm.

The sharp pulp market turnaround was triggered by downtime taken late last year and hedge buying in anticipation of recent price increases. Most industry observers, however, believe that customer inventories in the U.S. are still at low-to-moderate levels. Production of uncoated free-sheet papers has been strong, although coated and specialty grades have been showing some weakness.

Supply of southern pine paper pulp has been tightened by strong fluff demand, which reportedly has caused some major southern mills that produce both grades to swing to diaper pulp, according to industry observers. The surge in demand for fluff is probably related to intense competitive activity in the diaper market, where Procter & Gamble is rolling out its new superabsorbent diapers. More diapers are going into distribution channels, and consumers may be buying more—trying out a box of the new thin diapers along with their regular brands.

Inventories plunge. North American and Scandinavian inventories of chemical paper-grade market pulp dropped 181,000 metric tons in March to end the month at 1.13 million tons—their lowest level since June 1984. North American operating rates in March dropped to the low 90% range in March from 98% to 99% in February, while Swedish mills ran at 87% and Finnish mills—affected by a brief national strike—averaged 76%. Brazilian mills averaged 82% for the first two months of 1986, while Iberian mills reportedly took significant downtime. ■

SALES & EARNINGS

First-quarter U.S. paper industry profits dropped slightly

U.S. pulp and paper companies reported a 23.3% drop in earnings on a 1.6% decline in sales for the first quarter due to weak prices in a number of grade segments, according to a *Pulp & Paper* survey of results from 33 companies. But many CEOs predicted that earnings would strengthen over the balance of the year, and some Wall Street investment firms, such as Morgan Stanley & Co., predicted that the first quarter marked the "trough" of the current earnings cycle, and "measurably better profits" are expected for this quarter.

Price weakness from the second half of 1985 persisted in the first quarter and was the major reason for the earnings decline. Plus, several companies reported startup difficulties with new or modernized production facilities. These problems were partly offset by higher income from wood products operations and the sharp drop in the dollar, causing some firming of export prices.

U.S. paper/forest products industry first-quarter results.

Companies	Sales	Change 1986/85	Earnings[1]	Change 1986/85
Boise Cascade	$916,610	−4.3%	$25,000	−24.9%
Bowater Inc.	200,074	−7.6	5,172[2]	−65.7
Champion International	1,122,336	−31.8	22,001	−49.7
Chesapeake Corp.	133,623	64.6	(2,493)	n.m.
Consolidated Papers	161,742	−12.7	23,434	−14.4
Crown Zellerbach	706,200	−7.3	600	−96.9
Federal Paper Board	207,723	35.5	2,413	5.3
Fort Howard	319,439	3.5	36,987	11.4
Georgia-Pacific	1,604,000	1.5	30,000	−38.7[2]
P. H. Glatfelter	70,347	−3.0	10,297	−0.9
Great Northern Nekoosa	487,800	−2.1	11,600[2]	−16.5[2]
Hammermill Paper	457,618	6.9	11,452	44.6
International Paper	1,140,000	0.9	17,300	−55.3
James River (1/26)	608,648	4.5	15,645	5.3
Kimberly-Clark	1,037,200	3.5	73,200	1.2
Longview (1/31)	101,487	−12.8	1,195	−69.2
Louisiana-Pacific	322,560	19.0	1,360	286.6[2]
Mead Corp.	682,800	1.8	18,100	−23.3
Mosinee Paper	48,018	2.1	2,461	33.2
Pentair Inc.	131,145	−3.1	3,643	−40.2
Pope & Talbot	74,087	−10.8	(537)	n.m.
Potlatch Corp.	233,264	−0.6	13,643	18.8
Scott Paper	801,400	15.1	39,100	−7.1
Jefferson Smurfit	242,133	48.7	3,865	0.2
Sonoco Products	226,064	22.4	11,613	7.7
Southwest Forest Industries	142,518	−6.1	(4,262)[2]	n.m.
Stone Container	387,399	26.1	(4,720)	n.m.
Temple-Inland	292,700	−6.6	13,600	−37.3
Union Camp	495,028	6.8	22,039	−26.0
Wausau (2/28)	55,789	13.1	2,540	200.6
Westvaco (1/31)	416,440	−3.0	20,263	−10.9
Weyerhaeuser	1,306,743	2.4	49,984	30.7
Willamette Industries	272,145	−5.5	7,567	−47.0
Total	**$15,405,100**	**−1.6%**	**$480,982**	**−23.3%**

1. Income after taxes from continuing operations, excluding most significant nonrecurring items in both years.
2. **Bowater:** 1986 net income is after nonrecurring after-tax charge of $3.4-million for retirement of fixed assets; **Georgia-Pacific:** 1985 income includes $19-million gain from timberland sales; **Great Northern Nekoosa:** includes $3.1-million investment tax credit in 1986 and $2.1-million credit in 1985; **Louisiana-Pacific:** 1985 net excludes $29.4-million gain of cumulative effect of accounting change; **Southwest Forest:** 1986 loss excludes $77,000 loss from discontinued operations and $.7-million loss from induced conversion of convertible debentures; 1985 net excludes $350,000 loss from discontinued operations.

Recent price hikes on key grades such as market pulp, containerboard, and uncoated white papers plus improved operating efficiencies should help International Paper Co.'s earnings as the year progresses, according to IP's chairman and CEO, John A. Georges. But for the first quarter, the company reported a 55% decline in earnings from a year earlier. Georges noted that results were also hurt by startup costs at the company's recently modernized Mobile, Ala., mill.

Champion International Corp. reported a nearly 50% decline in earnings because of lower prices and volume for coated papers and a loss in its packaging segment, according to the company's chairman and CEO, Andrew C. Sigler. (In late February, Champion sold most of its remaining packaging operations—which had an operating loss of $4.7 million for the quarter—to Stone Container Corp.)

Mead Corp. reported a 23% decline in earnings for the first quarter. "Prices and order backlogs made a positive turnaround in the first quarter, although not soon enough to be fully reflected in the quarter's earnings, noted Burnell R. Roberts, chairman and CEO. "The falling U.S. dollar has reopened a number of export markets to U.S. producers, which enabled Mead to increase prices in some areas."

Little better than break-even earnings were reported by Crown Zellerbach Corp. for the first quarter. The main businesses to be operated by James River Corp. following the completion of an exchange offer—paper, packaging, and distribution—reported first-quarter operating earnings of $26.8 million compared with $33.5 million a year earlier. The businesses to be retained by Sir James Goldsmith—timber and wood products, containers, energy, and Eczel—had operating earnings of $1.1 million vs $15 million a year earlier.

Paperboard still weak. Stone Container Corp. posted a $4.7-million loss in first-quarter 1986 earnings, but chairman and CEO Roger W. Stone said prices "continue to strengthen" and reported that first-quarter shipments of corrugated containers, bags, and sacks "were at record highs." Union Camp Corp. chairman and CEO Gene Cartledge noted that the first

quarter showed "a meaningful improvement in operating performance compared with fourth-quarter 1985." He said his company expects demand and prices for paper and packaging to improve over the year.

Chesapeake Corp. reported a loss of $2.5 million for the first quarter due to low prices for kraft products from its West Point, Va., mill and difficulties with the new "Tri-Kraft" linerboard machine, which had estimated startup costs of $4 million during the period. Temple-Inland Corp. showed a 37% decline in profits related to depressed prices for containerboard, bleached board, and corrugated containers, as well as startup problems with its new Ontario, Calif., recycled linerboard mill, which had a net loss for the period.

Tissue results steady. Scott Paper Co. reported a 7% decline in net income for the first quarter, mainly due to interest expense connected with the purchase of its shares held by Brascan Ltd. Income from operations was up 16% and reflected record results from the company's domestic sanitary products business, international subsidiaries, and printing and publishing paper business. Despite a "highly competitive marketplace for tissue and cup products," Fort Howard Paper Co. achieved an 11% earnings increase because of higher volume, said its chairman and CEO, Paul J. Schierl.

Kimberly-Clark Corp. reported essentially flat earnings for the first quarter. Chairman and CEO Darwin Smith said that results were hurt by lower diaper volume and newsprint discounting. Conversion of lines to make an improved version of Huggies with an elastic waist reduced diaper output, but the upgrade has now been completed.

Better wood profits. Georgia-Pacific Corp. reported a 38.7% decline in earnings for the first quarter of the year. "Higher housing starts strengthened both demand and price for structural panels and lumber," according to G-P's chairman and CEO, T. Marshall Hahn Jr. "While softwood lumber prices have increased, price levels remain at unsatisfactorily low levels as the volume of Canadian lumber imports continues to increase. And price weakness in pulp and paper caused that segment of the company's business to generate only $2 million in operating profits vs $25 million a year ago," Hahn said. ■

Canadian mills' first-quarter earnings up from 1985

Signs of improved market conditions ahead are reflected in first-quarter sales and earnings reports of 15 leading Canadian pulp and paper firms. Sales for the first quarter of 1986 totaled C$3.859 billion, up 9.4% from first-quarter 1985, and net income of $126.671 million was 43.4% above depressed year-earlier levels. And most companies said that they expect declining interest rates, the weak Canadian dollar, and stronger world economic growth to result in an upward trend in earnings through the remainder of the year.

MacMillan Bloedel Ltd. led off with a ten-fold improvement in net income to $29.2 million (before a $45-million gain on the sale of part interest in a Dutch paper mill) from depressed first-quarter 1985 results. MB attributed its improved results primarily to higher lumber and pulp prices and to the weakness in the Canadian dollar in relation to the U.S. dollar.

The U.S. dollar averaged C$1.40 during the first quarter of 1986 compared with C$1.35 a year earlier and helped lift sales of Crown Forest Industries Ltd., noted the company's president, Ian Donald. The company more than doubled first-quarter earnings to $6.1 million, helped by improving wood products demand and prices plus cost reductions. Donald noted that pulp prices began to firm during the quarter as a result of industry production curtailments, but added that newsprint markets continue to be affected by world overcapacity and slow demand growth.

Great Lakes Forest Products Ltd., the only firm reporting a loss in the first quarter, blamed lower prices for kraft pulp and lower shipment volumes for newsprint. Intense price competition forced curtailment of its mills for varying periods of time during the quarter, noted GLFP's chairman and CEO, Charles J. Carter. However, he noted some recent positive signs included stronger prices for fine paper, lumber, and market pulp.

Canfor Corp. said its improved results (net income of C$2.2 million vs a loss of C$16.6 million a year earlier) came mainly from "efforts to reduce costs and increase productivity and volume, rather than from the recent strengthening of lumber and pulp prices, which did not provide major benefits until after the end of the quarter." Abitibi-Price Inc. said that despite its nearly 25% earnings decline in the first quarter, "full-year results are expected to be somewhat higher than last year." ■

Canadian paper/forest products industry first-quarter results.

Companies	Sales	Change 1986/85	Earnings[1]	Change 1986/85
Abitibi-Price Inc.	C$647,400	11.4%	C$17,800	−24.9%
British Columbia Forest Products	269,500	−2.9	4,800	−40.0
Canfor Corp.	271,700	9.4	2,200	n.m.
Cascades Inc.	82,500	53.0	4,800	100.0
Consolidated-Bathurst	453,800	10.3	14,700	−23.8
Crown Forest Industries	219,000	13.5	6,100	238.9
Domtar Inc.	562,700	6.7	31,300[2]	8.7
Donohue Inc.	117,400	6.0	4,400	−30.2
Fraser Inc.	142,568	0.2	1,100[2]	−38.9
Great Lakes Forest Products	141,706	−4.4	(470)	n.m.
MacMillan Bloedel	613,200	13.9	29,200[2]	1,023.1
Perkins Paper	13,693	19.0	723	40.4
Rolland Inc.	81,300	7.4	2,145	58.3
Scott Paper Ltd.	72,147	5.0	3,368	21.9
Weldwood	170,775	23.6	4,505	n.m.
Total	**C$3,859,388**	**9.4%**	**C$126,671**	**43.4%**

1. Income after taxes from continuing operations, excluding most significant nonrecurring items in both years.
2. **Consolidated-Bathurst:** excludes C$47.4-million write down of investment in two oil and gas firms; **Domtar:** excludes tax credits of C$6.2 million in 1986 and C$5.2 million in 1985; **Fraser:** excludes C$3.2 million in tax credits in 1986; **MacMillan Bloedel:** excludes C$45 million gain in 1986 on sale of part of holdings in Dutch paper company KMP.

n.m. = Not meaningful.

MECHANICAL PULPING: Producers looking to chemicals for quality

Of the 16 million metric tons of mechanical pulp produced in North America last year, 25% was treated with either sodium sulfite or sodium sulfite/caustic in a preliminary pulping stage, and nearly all of it was subject to bleaching agents after pulping. Consumption of sodium sulfite, peroxide, and sodium hydrosulfite is expected to increase significantly over the final years of the decade due simply to the market pressures for higher-quality products. These chemicals have helped manufacturers produce pulp that is brighter, stronger, and more versatile.

Pulping. Unfortunately, there has been some trouble with nomenclature of mechanical pulping processes that involve pretreatment chemicals. Countries, supplier companies, and paper companies have all contributed to the problem. The committees of the various technical associations (CPPA, TAPPI, EUCEPA) are working out a universal acronym glossary, but it may be some time before widely accepted standards are found. In the meantime, CPPA's Technical Section has provided the first glossary, with typical chemical inputs (percent Na_2SO_3/NaOH, based on wood) as follows: CMP (2% to 3%), CTMP (2% to 4%), CRMP (2% to 7%), TMCP (7% to 12%), SCMP (2% to 7%), and BCMP (5% to 7%).

Increased production of the processes so designated is a reflection of producers wanting higher yields in pulping, as well as end users wanting high-quality/low-cost materials. Sulfite mills, troubled by new environmental restrictions, will move to increase chemical consumption in mechanical operations, enhancing their yield and eliminating costly recovery and treatment of sulfite cooking liquor.

There are many proven reasons for chemical pretreatment of mechnical pulp. Compared with TMP, chemically treated TMP exhibits superior tensile, bulk, unbleached brightness, and opacity. However, the amount of chemicals added depends on the end use of the pulp. In a larger mill, particularly if it is using a CTMP process and the pulp is part of a newsprint furnish, consumption will be held to a minimum. Smaller mills, especially those converting to ultrahigh-yield sulfite methods and making pulp for specialty groundwood grades, will tend to favor increased amounts of chemical addition.

Other factors that affect pulp properties are the point of addition and temperature and pressure applied to chips in relation to the point of addition. It should also be taken into consideration that chemical pretreatment will be needed to maintain pulp quality as the quality of wood resources declines.

Bleaching. Much attention has centered on achieving a higher-brightness mechanical pulp. The driving force of this attention is end user market conditions. Standard newsprint prices remain depressed, yet grades suitable for offset and rotogravure printing have been fairly stable. Chemical suppliers of sodium hydrosulfite, peroxide, and Borol (a sodium hydrosulfite-based product from Ventron) have stepped up their shipments to the high-quality producers. Most suppliers see a rosy picture for the remainder of the decade if TMP growth continues and sulfite output declines.

The most bullish viewpoint has been taken by hydrogen peroxide producers, some backing up their forecasts with production expansion. In the U.S., FMC and Interox increased their output at existing facilities by 25,000 tpy. Degussa Corp., the German chemical firm's U.S. subsidiary, is constructing a 36,000-tpy plant in Mobile, Ala. Canadian supply should be aided by the construction of a DuPont plant in Maitland, Ont. (40,000 tpy), and the postponed FMC plant in Squamish, B.C. (11,000 tpy). Hydrogen peroxide has proved its ability to bleach mechanical pulp to high brightness, maintaining high yields without an increase in the effluent load. Typical additions are in the 2% to 4% range based on wood.

Two developments are also receiving a lot of attention. The announced construction of an onsite hydrogen peroxide generator at Abitibi-Price Inc.'s Provincial Papers in Thunder Bay, Ont., will interest mechanical pulp mills seeking peroxide-based systems. Two systems have been developed already. Degussa Corp. is planning to introduce its single-stage process at a European site in 1986 and the Canadian research institute, PAPRICAN, is developing the PRP sequence (peroxide-reduction-peroxide) for initial commercial applications at Consolidated-Bathurst Inc.

The largest share of the mechanical pulp bleaching market is still held by the producers of sodium hydrosulfite-based products. The principal suppliers, Ventron and Virginia Chemicals, have commented that their products are being modified on a site-specific basis. The reason seems to be tied to the varying wood resources available to customers (mills). Both suppliers expect repetition of the steady growth experienced in 1985 but without the benefit of a price hike. No supply increase has been mentioned by either company, but the availability of product should remain loose throughout the year.

TABLE 1: **Chemical consumption of mechanical pulping systems in North America (short tons).**

	Mechanical pulping	All pulp & paper	All industry	Price[2]
Sodium hydrosulfite[1]	51,000	51,000	150,000	0.64
Hydrogen peroxide[3]	22,000	33,000	150,000	0.61
Sodium sulfite[4]	37,000	—	—	0.23

1. Includes hydrosulfite produced from sodium borohydride solutions.
2. End of first quarter, dollars per pound.
3. Courtesy of E.I. DuPont Corp.
4. Includes sodium bisulfite produced from caustic and sulfur dioxide.

MECHANICAL PULPS SERVE A VARIETY OF END USES AS CAPACITY OF LINES GROWS

PPI survey shows investment in modern mechanical pulps is increasing—about 260 installations are in operation or planned

P&P Staff Report

The world's capacity of modern mechanical pulps will increase by 6.5 million tons during the 1986-88 period, reaching a total installed capacity of 22.5 million tons. That is the main finding of the 1986 Modern Mechanical Pulps Survey carried out by *Pulp & Paper International*'s Data Products Dept., which lists 48 projects scheduled to start up in the next three years.

It is clear from the survey results that 1986 is a key year for modern mechanical pulps. New capacity for the year will total 13% of installed tonnage—the largest rise in capacity recorded in the history of *PPI*'s survey, which started in 1968. Meanwhile, some of the largest lines yet built are coming onstream this year or are in their initial construction phases.

The survey also confirms the trend noted last year toward continued diversification of end uses for all types of mechanical pulps. Two new market chemi-thermomechanical pulp (CTMP) lines have started up in Europe since the last survey. In early 1987, KNP's Lanaken mill in Belgium will start up a CTMP line supplying pulp for a lightweight coated (LWC) paper machine.

Thermomechanical pulp (TMP) continues to be the dominant grade. While it is a standard grade for newsprint, it is also finding use in directory paper and LWC grades. Pressurized groundwood (PGW) pulping is gaining a good reputation with printing paper manufacturers, especially in the supercalendered (SC) paper market. The latest orders for the Tampella system are coming from the U.S. and Japan.

A new category has been added to this year's survey: thermogroundwood (TG) pulping. Developed by Voith, Fed. Rep. Germany, this process is essentially conventional stone groundwood pulping but with accurate temperature control of the grinding zone. So far, 11 stone groundwood grinders have been rebuilt for the new process, and a further 14 modifications to existing installations are expected to be in service by early 1987. Voith is unwilling to disclose the names of the purchasing companies, but most of them are believed to be in Europe.

AVERAGE LINE CAPACITY IS GROWING. Analyzing the end uses for all mechanical pulps, *PPI* finds that by the end of 1986, almost 14 million tpy will be consumed by newsprint producers—most of it TMP. The second biggest consumers are other printing and writing grades, with about 3 million tpy, again with the major share being TMP. From 1985 to 1986 inclusive, about 500,000 tons will have been added to the world's capacity for these grades. The equivalent figure for newsprint is about 2 million tpy. Market pulp now accounts for about 2 million tpy of production, and of this 800,000 tpy are CTMP.

All measurements contained in this article are metric.

TABLE 1: **Modern mechanical pulps, 1968-88: number of installations by continent and end product.**

Grade	Europe	North America	Other	Total
Board	16	2	0	18
Molded products	2	2	0	4
Market pulp	17	6	3	26
Newsprint	52	62	31	145
Other	1	2	2	5
Printing/writing	29	20	3	52
Pilot plant	2	2	2	6
Tissue	1	1	2	4
Total	120	97	43	260

TABLE 2: **Modern mechanical pulps, 1968-88: capacity by continent and end product (000 metric tpy).**

Grade	Europe	North America	Other	Total
Board	823	72	0	895
Molded products	18	35	0	53
Market pulp	826	645	456	1,927
Newsprint	319	2,545	2,591	15,055
Other	2	309	11	322
Printing/writing	1,957	1,805	157	3,919
Pilot plant	10	7	23	40
Tissue	65	85	52	202
Total	8,660	10,809	3,290	22,542

Subjecting the survey results to computer analysis showed that the average size of the modern mechanical pulp line has grown considerably since the mid-1970s. Although the results are somewhat distorted by some extremely large installations (i.e., TMP lines at major newsprint mills), there is a clear trend toward higher-capacity units. Whereas the average pulp line size was approximately 50,000 tpy in 1976, tdoay it is approximately 115,000 tpy, and by 1987 it can be expected to reach some 135,000 tpy.

Clearly, the reservations that pulp and paper producers may have had about the new mechanical pulps are rapidly being overcome, as are their reservations (and their bankers' reservations) about finance. Modern mechanical pulp lines can be built relatively quickly (about 18 months for a CTMP line) so that construction can be timed more easily to match market conditions than is possible with chemical pulp lines.

MECHANICAL PULP GRADES IN 1986. Looking at the modern mechanical pulps grade by grade, starting with CTMP, many observers expect that greenfield market pulp capacity in the short term is likely to be in the form of relatively small (and relatively cheap) CTMP lines. The expanding fluff pulp market will be the target.

Further indications toward how such investment will proceed have been given by the startup of the two European mills, which are producing some of their output for the market. MoDo-Iggesund completed its joint venture investment in a 65,000-tpy CTMP line at Domsjö, Sweden, last December. Serlachius, Finland, started up its 70,000-tpy line—the first CTMP line in Finland—in April of this year.

Both lines are located on the sites of former sulfite pulp mills, with ready-made infrastructures and easily available chemicals. Both are subsidiaries of major producers with interests in both tissue and board—grades

TABLE 3: **Selected mechanical pulp projects, 1985–88 (000 metric tpy).**

Country	Location	Startup date	Capacity (1,000 tpy)	Type of pulp	Raw material	Grades produced	Supplier
Australia							
Australian Newsprint Mills	Boyer, Tasmania	1987	72	TMP		Newsprint	Sunds Defibrator
Bangladesh							
Khulna Newsprint Mills	Khalishpur, Khulna	1985	48	CMP	Gewa wood	Newsprint, magazine	
Belgium							
Papeteries de Belgique	Langerbrugge	1986	88	TMP	Spruce, pine	Newsprint	Jylhävaara
KNP	Lanaken	1987	70	CTMP		LWC	Sunds Defibrator
Brazil							
Papel Imprensa	Jaguariaiva Parana	1985	70	TMP	Pinus taeda & elliotti	Newsprint	Bauer
Canada							
Abitibi-Price	Gaspesie, Que.	1986	85	CMP	Spruce	Newsprint	Bauer
Consolidated-Bathurst	Shawinigan, Que.	1987	210	CTMP	Spruce, balsam	Newsprint	Sprout-Waldron
Corner Brook	Corner Brook, Nfld.	1988	120	TMP	Spruce	Newsprint	Bauer
Domtar Industries	Nanaimo, B.C.	1988	175	TMP		Market pulp, news	
Domtar	Dolbeau	1987	210	CTMP		Newsprint	Sunds Defibrator
Donohue	Clarmont, Que.	1985	300	TMP	Black spruce/ balsam/fir	Newsprint	Sunds Defibrator
Kruger	Bromptonville, Que.	1986	169	PRMP	Spruce, balsam	Newsprint	Bauer
Kruger	Bromptonville, Que.	1988	72	TMP	Spruce	Newsprint	Bauer
MacMillan Bloedel	Powell River, B.C.	1985	245	CTMP			
Makin Project Initiators	Brittania Beach, B.C.	1988	135	CTMP	Spruce, aspen	Market pulp	Sprout-Waldron
Ontario Paper	Thorold, Ont.	1986	20	TMP	Pine, spruce	Newsprint	Hymac
Tembec Forest Products	Temiscaming, Que.	1986	100	CTMP	Softwood, hardwood	Market pulp	Sunds Defibrator
China, People's Rep.							
Jilin Paper Mill	Jilin	1987	45	CTMP		Newsprint	Sunds Defibrator
Costa Rica							
Scott Paper de Costa Rica	San Jose	1987	7	CTMP			Sprout-Waldron
Finland							
Kajaani	Kajaani	1986	168	TMP		Newsprint	Sunds Defibrator
Serlachius	Lielahti	1986	70	CTMP	Spruce	Market pulp	Sunds Defibrator
United Paper Mills	Kaipola	1987	175	TMP	Spruce	LWC	Jylhävaara
France							
Nouvelle Chapelle Derbley	Grande Couronne	1986	140	TMP	Spruce, pine	Newsprint, directory	Sprout-Waldron
Nouvelle Chapelle Derbley	Grande Couronne	1987	75	TMP	Pine, spruce	Newsprint	Sprout-Waldron
Nouvelle Chapelle Derbley	St. Etienne-du-Rouvray	1986	100	TMP	Spruce	LWC	Sprout-Waldron
Germany, Fed. Rep.							
Albbruck	Albbruck	1986	35	PGW		Woodcontaining pr/wr	Tampella
Haindl	Schongau	1987	100	TMP	Spruce	Newsprint	Sprout-Waldron
Haindl	Walsum	1985	100	TMP	Spruce	LWC	Sunds Defibrator
Haindl	Walsum	1986	42	TMP		LWC	Sunds Defibrator

that are almost universally considered prime potential consumers of CTMP—so they can guarantee that a large proportion of production will be captured by the parent firms.

The two companies are aiming to sell the balance of the production to sanitary paper and diaper manufacturers. To this end, they are offering pulp in both sheeted bales and reels. This is considered highly important to winning market share since most users of fluff pulp work with reels.

CTMP market pulp is also under consideration in the Congo. Rather than building a chemical pulp mill to use its extensive eucalyptus forests, the Congolese government is considering a CTMP line. If it goes ahead, the project will be one of the first commercial CTMP processes to use eucalyptus wood. Target markets would not only include tissue producers and board makers but would also include printing/writing paper mills. The Congolese government is arranging for a market study to be carried out on the acceptability of the new pulp. Eucalyptus logs will be shipped to Rottneros Bruk AB's CTMP mill in Sweden, and a sample of about 200 tons will be produced for trials during the summer at European mills.

A second interesting aspect of CTMP is its increased use in printing/writing paper. Manufacturers of these grades are becoming more interested in bleached CTMP as an element in their furnishes. Part of the problem in implementing its use is the need to satisfy government authorities that the effluent from bleached CTMP lines is within acceptable limits.

Some of the pioneering work in introducing CTMP to LWC paper is being carried out in Belgium by KNP's Lanaken mill. Latest reports indicate that the mill will start up ahead of schedule in December 1986, making 175,000 tpy of LWC and using 55,000 tpy of CTMP furnish.

The large majority of the pulp produced by the 239 lines operating around the world is TMP for newsprint

Country	Location	Startup date	Capacity (1,000 tpy)	Type of pulp	Raw material	Grades processed	Supplier
Japan							
Chuetsu Pulp		1986	80	CTMP		Newsprint	Sunds Defibrator
Oji Paper	Tomakomai	1986	45	PGW	Red pine	Woodcontaining pr/wr	Tampella
Mexico							
Durango, Grupo Industrial	Durango	1986	85	CTMP	Pine	Market pulp	Sprout-Waldron
Netherlands							
Parenco	Renkum	1987	160	TMP	Pine, spruce	Newsprint	Sprout-Waldron
New Zealand							
Forest Research Institute	Rotorua	1986	20	CTMP		Pilot plant	Jylhävaara
New Zealand Forest Products	Marsden Point	1988	30	TMP	Pine	Coated pr/wr	
Nigeria							
Nigerian Newsprint	Oku Iboku	1985	100	CMP	Gmelina	Newsprint	
Norway							
Follum Fabrikker	Hönefoss	1987	200	TMP	Spruce	Newsprint	Sprout-Waldron
Sweden							
Billerud	Grövon	1989	0	TMP	Softwood	Board	
Holmens Bruk	Braviken	1985	36	TMP		Newsprint	Sunds Defibrator
Holmens Bruk	Braviken	1986	42	TMP		Newsprint	Sunds Defibrator
Holmens Bruk	Hallstavik	1985	30	TMP		Newsprint	Sunds Defibrator
MoDo-Iggesund	Domsjö	1986	65	CTMP		Board, tissue	Sunds Defibrator
Rockhammars Bruk	Frövi	1985	40	CTMP	Softwood	Market pulp	
SCA	Ortviken	1985	250	TMP	Spruce	Newsprint	Sunds Defibrator
Stora	Kvarnsveden	1986	63	TMP		Newsprint	Sunds Defibrator
Taiwan							
Chung Hwa	Hualien	1985	85	CTMP		Newsprint	
United Kingdom							
Shotton Paper	Shotton	1985	250	TMP	Spruce	Newsprint	Jylhävaara
Thames Board	Workington	1985	31	TMP	Spruce, pine	Paperboard	Sunds Defibrator
U.S.							
Bowater	Calhoun, Tenn.	1986	350	TMP	Southern pine	Newsprint	Bauer
Bowater Carolina	Catawba, S.C.	1986	137	TMP	Southern pine	Coated grades	Bauer
Catawba Newsprint Co.	Catawba, S.C.	1986	221	TMP	Southern pine	Newsprint	Bauer
Consolidated Papers	Biron, Wis.	1986	73	TMP	Spruce	LWC	Sprout-Waldron
Inland Empire	Spokane, Wash.	1986	365	CTMP	Douglas fir	Newsprint	Sprout-Waldron
Lake Superior Paper Ind.	Duluth, Minn.	1987	140	PGW	Spruce, balsam fir	SC papers	Tampella
U.S.S.R.							
Balachus	Balachus	1988	200	CTMP	Aspen, spruce	Newsprint	Sunds Defibrator
Syktyvkar	Syktyvkar	1987	165	CTMP	Spruce, aspen	Pr/wr, magazine	Sunds Defibrator
Undisclosed							
Newsprint/LWC/SC		1985-87	269	TG	Spruce/pine/fir		Voith
Tissue		1986	85	CTMP	Pine		Jylhävaara

1. Capacity of latest investment.
TMP = thermomechanical pulp; CTMP = chemi-thermomechanical pulp; CMP = chemimechanical pulp; PGW = pressurized groundwood pulp; TG = thermogroundwood pulp; PRMP = pressurized refiner mechanical pulp.

production. Svenska Cellulosa AB's Ortviken line is now ranked as the world's biggest integrated TMP line, with a daily output of 2,000 tpd from a line of Sunds Defibrator refiners. The company is among the few producers in the world to make some of its newsprint with 100% TMP furnish.

One of the biggest TMP investments planned for the next three years is the line to be built in Finland by Jylhävaara for United Paper Mills' Kaipola mill, where a 9.1-m 170,000-tpy LWC machine will come onstream in 1987.

Pressurized groundwood pulp has made an international impact this year, with developments in Japan, the U.S., and Europe. Lake Superior Paper Industries' system will start up in 1987, making 140,000 tpy of PGW, the largest line in the world.

TG pulps made their debut in 1985. Voith describes their quality as being between stone groundwood pulp and PGW. Consequently, they are suitable for use in a wide range of papers, but they compete essentially with PGW.

TECHNICAL DEVELOPMENTS. On the technical side, significant developments in refiner and grinder technology and heat recovery systems for modern mechanical pulping methods continue. Supporting PPI's finding that lines are becoming bigger, Sunds Defibrator has also launched a new conical-disc refiner, the RGP-76-CD, which has a single-stage capacity of 180 tpd. The first installation will be at Stora Kopparberg Group's Kvarnsveden newsprint and SC paper mill in Sweden. Power requirement is up to 18 MW at 50 Hz.

Another example is a large two-stage refiner, the HXD 64, launched by Hymac and capable of up to 30,000 installed hp. The refiner has two independent refining zones with intermediate steam extraction. A thrust bearing is provided to absorb the differential thrust between the refining zones. This permits operation of one zone by itself. The first such refiner will start up in 1987, according to the company. Sprout-Waldron has also introduced a large refiner—the Twin 60—with an installed power of 22,000 hp.

Research into all aspects of the CTMP process has led to the development of a two-stage impregnation process at the Rottneros mill in Sweden. This system, which will also be installed at Makin Pulp & Paper Ltd., Alberta, Canada, enables two different chemicals to be used to impregnate the chips in two successive stages. The second stage operates under pressure.

Considerable work is also being put into the treatment of rejects. Sunds Defibrator has worked with Bowater Svenska AB's mill in Umeå, Sweden, to produce a new system for handling rejects from stone groundwood pulp lines. Called the $CTMP_R$ process, rejects from the screen room are pumped to a dewatering press, where consistency is increased to 35%. They are then moved by screw conveyor to a Rotomixer for mixing with 2% to 3% sodium sulfite. After a retention time of 5 to 10 min in a reactor vessel, the rejects are sent to a pressurized refiner. The heat generated in refining is recovered and used for the chemical treatment stage. Bowater and Sunds Defibrator say that the pulp produced is low in shives and is salable as market pulp.

MacMillan Bloedel Ltd.'s Powell River, B.C., mill has taken delivery of equipment for chemical treatment of long fiber (CTLF) from Hymac. With a design capacity of 360 b.d. tpd, the system will start up this month. Screened rejects from a CTMP line are thickened in a screw press to 30% consistency then fed through a pulp plug screw feeder into a high-consistency steam and chemical mixer. The pulp is retained under pressure in a vertical digester in the presence of sodium sulfite for about 20 min before being discharged to a transfer chest. It is then washed in a second set of presses before being fed to the reject refiners.

For PGW, Tampella says that using a Hedemora pressure disc thickener in the grinding system increases pulp strength by 15% and improves heat recovery. ■

TABLE 4: **New mechanical pulp installations by type, 1984-88, (000 metric tpy).**

Year	TMP	CTMP	PGW	CMP	PRMP	TG	Total
1984 capacity	831	445	77	—	—	31	1,384
Number of installations	7	6	2	—	—	1	16
1985 capacity	1,324	435	—	148	—	111	2,018
Number of installations	9	4	—	2	—	3	18
1986 capacity	1,824	860	80	85	169	89	2,827
Number of installations	15	3	2	1	1	3	30
1987 capacity	782	682	140	78	—	82	1,764
Number of installations	6	5	1	1	—	1	14
1988 capacity	247	200	—	100	—	—	547
Number of installations	2	1	—	1	—	—	4
Total capacity	4,808	2,622	297	411	169	293	8,600
Number of installations	39	24	5	5	1	8	82

TMP = thermomechanical pulp; CTMP = chem-thermomechanical pulp; PGW = pressurized groundwood pulp; CMP = chemimechanical pulp; PRMP = pressurized refiner mechanical pulp; TG = thermogroundwood pulp.